CLAIMS

What is claimed is:

- 5 l. A process for purifying hydrogen from a stream of reformate gases comprising:
 - a. preparing a flow cell in which 2 gas flows are separated by a solid state ceramic membrane,
 - b. heating said cell to greater than 500C,
- 10 c. passing said reformate gas and a small amount of steam on one side of said membrane and steam on the second side of said membrane, and
 - d. separating purified hydrogen from said second side of said membrane.

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- 2. The process of claim 1 wherein said reformate gases are selected from the group consisting of:
- (a) mixtures of carbon monoxide and hydrogen;
- (b) mixtures of carbon monoxide and hydrogen containing small
- quantities of other hydrocarbons or hydrocarbon reformate or inert gases such as Ar, He or nitrogen;
 - (c) by-products from the partial oxidation or steam reformation of methane;
- (d) partial oxidation or steam methane reformation products of25 other hydrocarbons;
 - (e) products of carbon dioxide reformation of hydrocarbons;
 - (f) products of autothermal reformation of methane and other hydrocarbons; and
 - (g) mixtures thereof.

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3. The process of claim 1 wherein said membrane is selected from the group consisting of single phase and two-phase membranes.

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4. The process of claim 3 wherein said membrane is selected from the group consisting of:

strontium doped lanthanum iron cobalt oxide of the composition $La_{(1-x)}Sr_xCo_{(1-y)}Fe_yO_3$;

- 5 $La_{(1-x)}Ca_{x}Co_{(1-y)}Fe_{y}O_{3}$;
 - $La_{(1-x)}Sr_xCo_{y1}Fe_{y2}Ni_{y3}Cr_{y4}O_3$;

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yttria stabilized zirconia doped with an oxide selected from the group consisting of MnO_2 , TiO_2 , FeO, Cr_2O_3 and other transition metal oxides;

- 10 undoped CeO₂;
 - CeO_2 doped with an oxide selected from the group consisting of MnO_2 , TiO_2 , FeO, Cr_2O_3 and other transition metal oxides;
 - yttria stabilized zirconia and a metal selected from the group consisting of Pd, Pt, Ni, Ag and Au;
- 15 RE_2O_3 doped CeO_2 , where RE is Y, Yb, Sc, or Gd, and a metal selected from the group consisting of Pd, Pt, Ni, Ag and Au; $La_{1-x}Sr_xMg_yGa_{1-y}O_3$ and Ni;

La_{1-x}Sr_xMg_yGa_{1-y}O₃ and Pd and

mixtures thereof, where x<1, y<1, and y1+y2+y3+y4=1.

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5. The process of claim 3 wherein said membrane is selected from the group consisting of:

strontium doped lanthanum iron cobalt oxide of the composition $La_{(1-x)}Sr_xCo_{(1-y)}Fe_yO_3$, where 0<x<1 and 0<y<1;

- La_(1-x)Ca_xCo_(1-y)Fe_yO₃ , where 0<x<l and 0<y<1; and La_(1-x)Sr_xCo_{y1}Fe_{y2}Ni_{y3}Cr_{y4}O₃ where x<l and yl+y2+y3+y4=1 .
 - 6. The process of claim 3 wherein said membrane is $La_{(1-x)}Sr_xCo_{(1-y)}Fe_yO_3$, where 0<x<0.4 and 0<y<1 .
 - 7. The process of claim 3 wherein said membrane is $La_{0.9}Sr_{0.1}Ga_{0.8}Mg_{0.2}O_3 + Pd$.

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